

DETAILED ACTION

Drawings

1. Figures 8-10 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1- are rejected under 35 U.S.C. 103(a) as being unpatentable over Fiora (US patent 6014909) in view of Genter et al. (US patent 5870928).

Regarding claim 1,

Applicant claims an arm mechanism for a robot comprising:

- An arm portion of which one-end side in a longitudinal direction is supported, and while other-end side in the in the longitudinal direction is rotatable around a rotation axis elongating in the longitudinal direction with respect to said one-end side;
- A driving portion being apart from the rotation axis and disposed in said one-end side of said arm portion, in which a reduction gear is coupled to an output shaft of a driving motor;
- A driven gear, rotatable around the rotation axis, and connected to said other-end side of said arm portion;
- A passing hole which is disposed along the rotation axis and passing through said driven gear in a manner such that said passing hole is opened to an outside of said one-end side of said arm portion so as to communicate with said other-end side of said arm portion; and
- A scissors gear which is disposed on the output shaft of said reduction gear so as to mesh with said driven gear.

Regarding claim 2,

Applicant further claims the scissors gear which meshes with a driven gear and has a substantially same tooth shape overlap and which allows for urging of the main and sub spur gears by a spring in opposing directions and comprises:

- Accommodating grooves that are recessed in overlapping faces through which said main spur gear and said sub-spur gear overlap with each

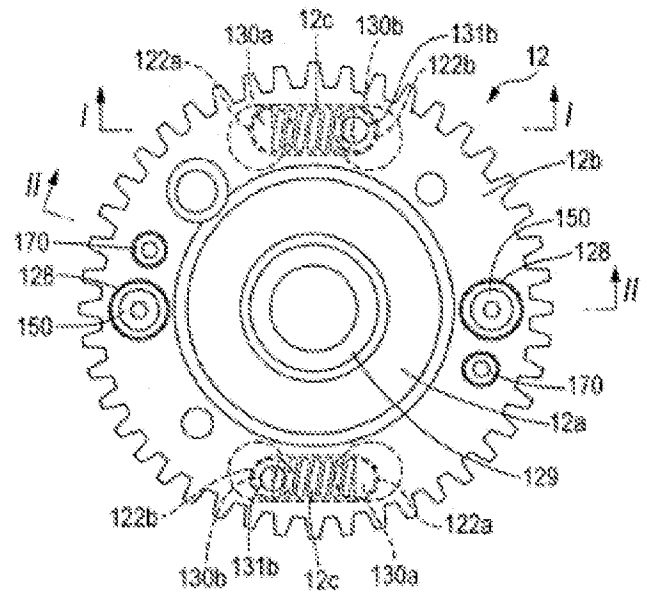
other, respectively, that are opposingly placed, and internally accommodate said spring;

- Spring receiving members which are fixed into said accommodating grooves, respectively, between which said spring is placed, and which hold a center of said spring in an elasticity direction with being coincident with positions of said overlapping faces; and
- A gap portion which is disposed between inner walls of said accommodating grooves and said spring receiving members.

Regarding claim 3/1 and 3/2,

Applicant further claims the scissors gear which meshes with a driven gear and has a substantially same tooth shape overlap and which allows for urging of the main and sub spur gears by a spring in opposing directions and comprises:

- A slider where said slider is fitted into one of said main spur gear and said sub-spur gear, and movement of the gears with respect to each other is allowed;
- An engaging member which engages with both main and sub-spur gears via said slider in an overlapping manner.



Fiora teaches an arm mechanism for an industrial robot (fig.1, 9 and 11) comprising:

- An arm portion (fig.2, 9) with one-end side (fig.2, 8) and the other-end side (fig.2, 16) which is rotatable around the axis (fig.2,10) which extends through both sides;
- A driving portion (fig.2, 25-27, arrangement of motors) which is located apart from the axis (fig.2,10) and disposed in said one-end side and has a reduction gear coupled to an output shaft of a driving motor (fig.2, 25,26,27 and col.3, lines 1-5);
- A driven gear (fig.2, 29) which is connected to the other end portion;
- A passing hole (fig.2, 40, space inside tube) is disposed along the rotation axis and passes through the driven gear as depicted in figure 2 such that both ends of the arm portion communicate;

Fiora fails to teach a scissors gear disposed on the output shaft of said reduction gear.

Regarding claim 2 and 3,

Fiora fails to teach the scissors gear and therefore fails to teach these claims.

It is clear that Fiora fails to teach the use of a scissors gear in order to reduce backlash in the robot wrist.

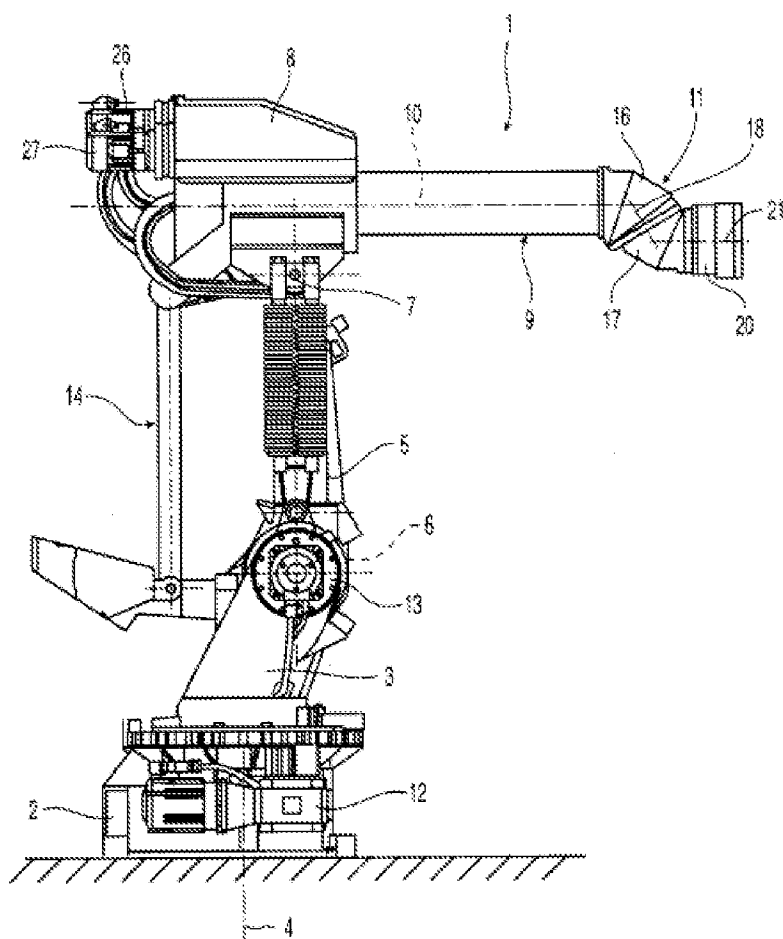


Fig. 1

Figure ii- Fiora's robot.

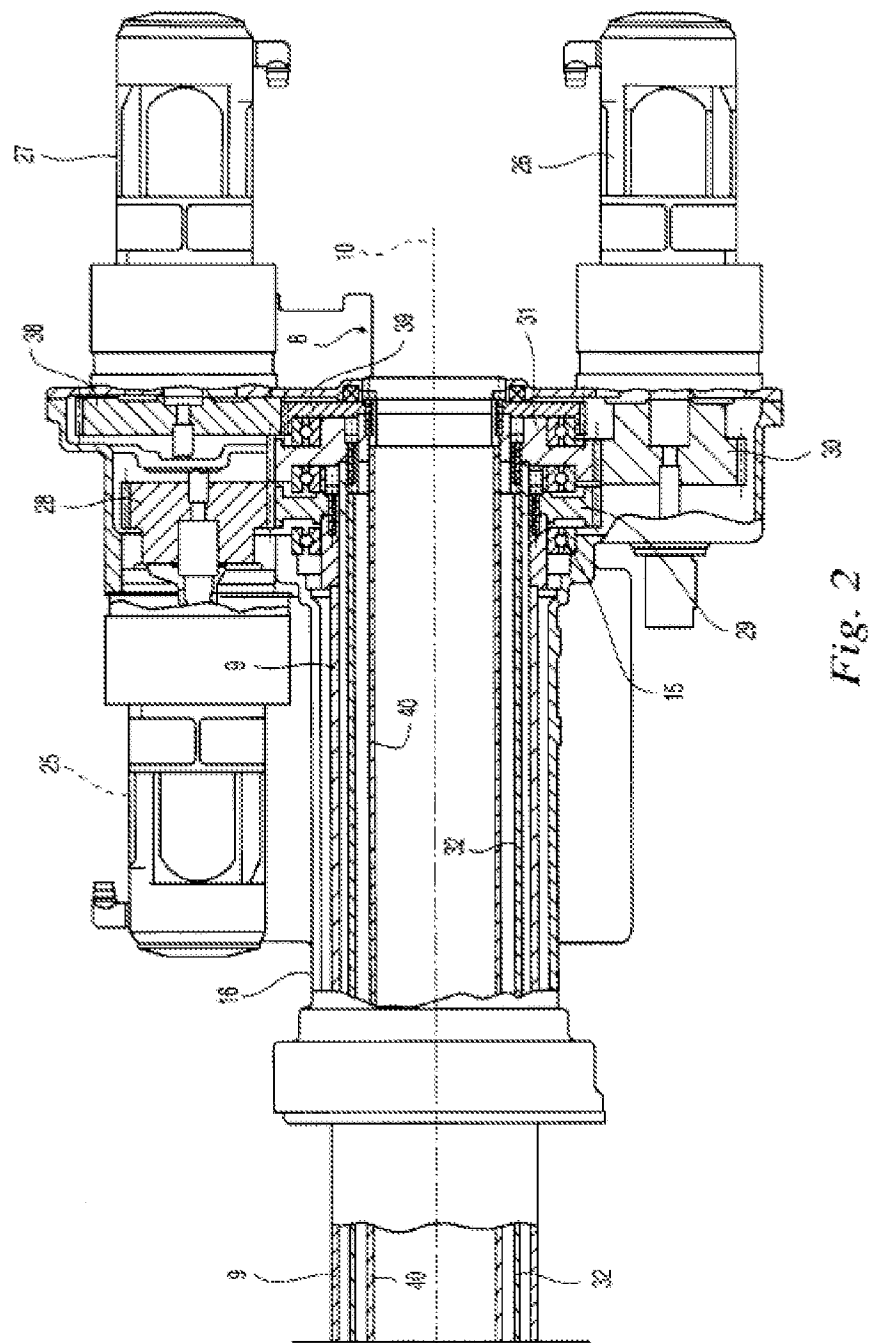


Fig. 2

Figure iii- Fiora's robot.

Genter et al. teaches:

Regarding claim 1,

Genter et al. teaches a scissors gear (fig.5) used in gear trains in order to reduce backlash (col.1, lines 31-33).

Regarding claims 2, 3/1, and 3/2,

Genter et al. teaches that the scissors gear as seen below is in a form of a main spur gear (fig.5, 60) and sub-spur gear (fig.5, 70) that have substantially the same tooth shape seen in fig.5. The scissors gear allows has springs (fig.5, 81) which allow for urging of both main and sub-spur gears in opposing direction or relative directions with respect to each other which allows the take-up of backlash (col.7, lines 4-7).

The scissors gear comprises:

- Accommodating grooves (fig.5, 65, 75) which are recessed in the overlapping faces of the main and sub spur gears (col.5, lines 51-54).
These are opposingly placed and accommodate springs (fig.5).
- Spring receiving members (fig.5, 74a and 65a) which are fixed inside the accommodating grooves and between which said spring is placed. These members hold the spring in place in an elasticity direction between the overlapping faces of gears.
- A gap portion (fig.4 or fig.5, 80) disposed between the inner walls of the accommodating grooves and spring receiving members and allows the spring to expand or contract due to the relative movement of the gears in order to take up back lash of a driven gear (col. 7, lines 4-7).

- A slider (fig.5, 73, The examiner take the position that the hub functions as a slider.) and allows motion of the main and sub-spur gears with respect to each other (col. 5, line 67 - col.6, lines 1-2).
- An engaging member (fig.1, 53) which engages the main and sub spur gears via said slider in an overlapping manner (col.5, lines 24-26).

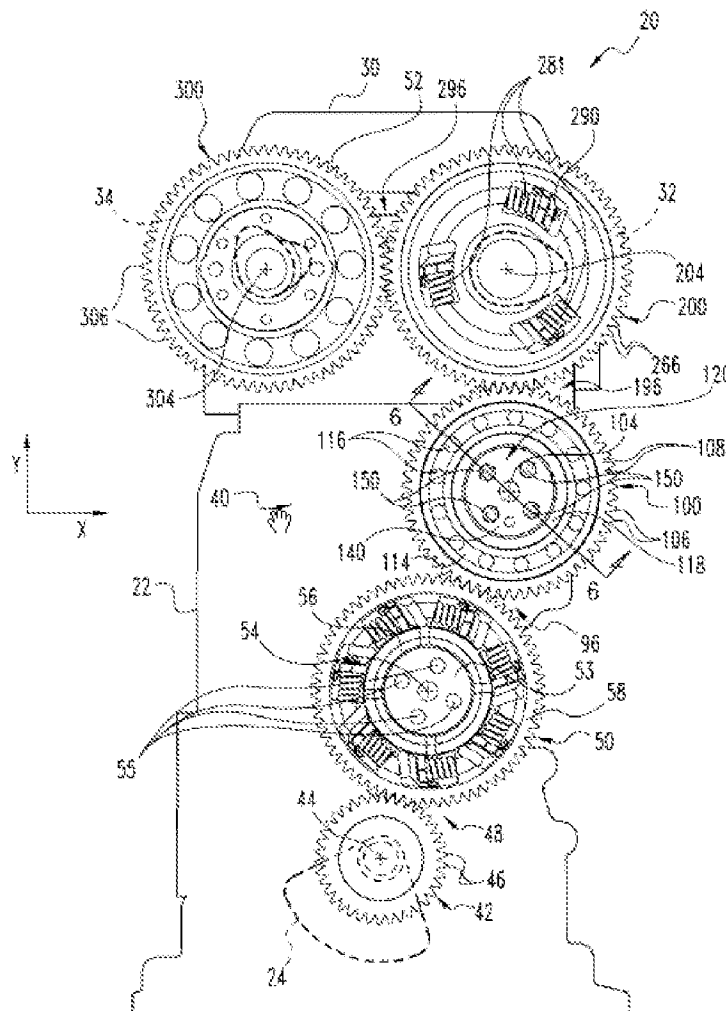


Fig. 1

Figure iv- Genter et al.'s invention.

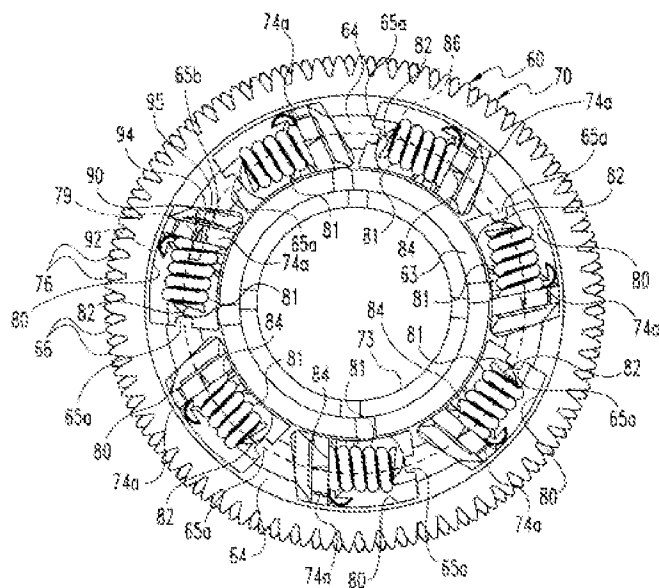


Fig. 4

Figure v- Genter et al.'s scissor gear.

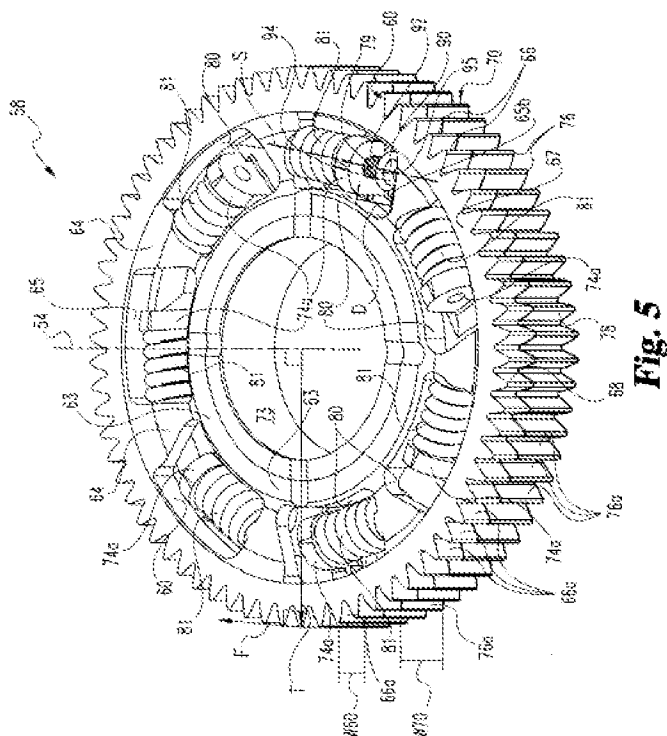


Fig. 5

Figure vi- Genter et al.'s scissor gear.

As discussed by Genter et al. the use of scissors gears in gear trains allows for the reduction of backlash (col.1, lines 31-33). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the scissors gear taught by Genter et al. with the gearing in the robot wrist or arm mechanism taught by Fiora in order to produce an arm mechanism with an anti-lash gear assembly which also accommodates high loading (col. 2, lines 3-5).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas Diaz whose telephone number is (571)270-5461. The examiner can normally be reached on Monday-Thursday 7:30am-6:00pm, Friday's off..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Larry Tarazano can be reached on (571)272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 4171

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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